PRIVATE LINE INTERCONNECTION ARRANGEMENT FOR LINE SIDE OF 10-TYPE DATA LINE CONCENTRATOR DESCRIPTION

CONTENTS PAGE

1. GENERAL

1.01 This section covers the physical and functional description of the interconnection arrangement for the line side of the 10-type Data Line Concentrator. These arrangements are used for private line (PL) telegraph facilities serving Data Set 108- and 109-type data stations and PL voiceband facilities serving Data Set 108-type data stations.

1.02 This section is reissued to:

(a) Include Addendum 591-811-102, Issue 1.

(b) Include information pertaining to the AR463, Series 2 circuit pack. The AR463, Series 1 circuit pack has been rated manufacture discontinued (MD).

(c) Remove all reference to the acronym DATREX.

(d) Add reference to the use of Data Sets 109D or 109E as the line-side data set.

1.03 The PL interconnection arrangement provides the means for interfacing PL voiceband or PL telegraph channels to the ▶data line◀ concentrator. These channels must be equipped with the proper type data station at the other end. It also contains the circuitry necessary for the recognition of the quasi-ternary supervisory signalling used in the ▶Data Line Concentrator◀ System.

1.04 A private line ▶data line concentrator◀ interconnection arrangement (Fig. 1) is made up of a Data Set 108A, 109A, ▶109D, or 109E◀ (line-side data set), a Data Set 109D or 109E (concentrator-side data set), an AR463, ▶Series 2◀ circuit pack, and a 208A adapter. All of these are mounted in a 28A1 Data Mounting. The 28A1 Data Mounting will accommodate up to three arrangements ▶using Data Sets 108A or 109A as the line-side data set or up to four arrangements using Data Sets 109D or 109E as the line-side data set. Some of the early installations may contain the AR463, Series 1 circuit pack. Since both the series 1 and series 2 AR463 circuit pack perform the same function, either or both may be used in any installation.◀

1.05 The Data Set 108A is used to face a PL voiceband channel or a PL telegraph channel [half-duplex (HDX) or full-duplex (FDX) operation] where a Data Set 108C or 108B is used at the station or hub, respectively. Data Set 109A ▶or 109D◀ is used to face a private line telegraph channel (HDX operation only) where a Data Set 109B is used at the hubbing point. ▶Data Set 109E is used to face a private line telegraph channel (FDX operation) where a Data Set 109G is used at the hubbing point.◀

1.06 Either Data Set 109D or 109E may be used to face the ▶data line◀ concentrator for HDX operation. However, for FDX operation, only the Data Set 109E may be used.

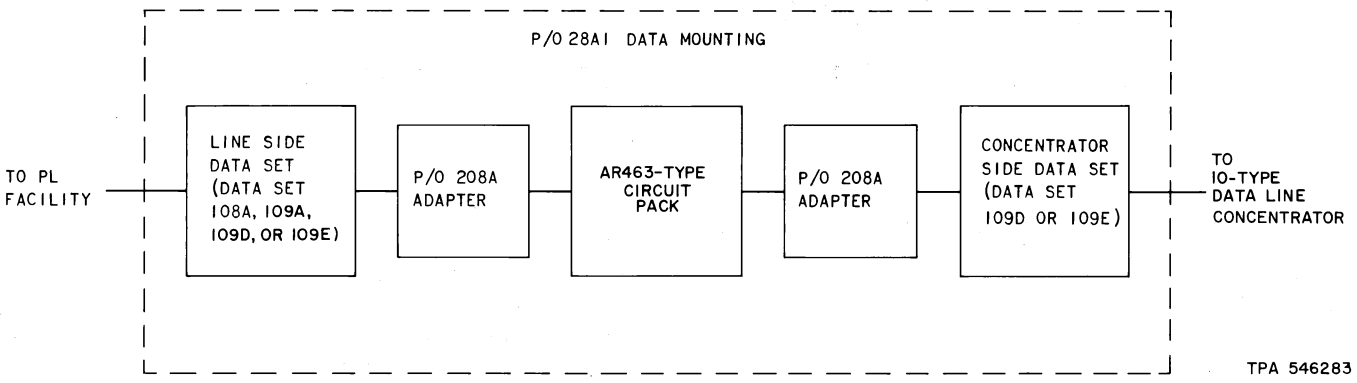


Fig. 1—Block Diagram of Private Line Interconnection Arrangement for Line Side of 10-Type Data Line Concentrator

1.07 The ▶AR463-type circuit pack◀ provides the circuitry necessary for the interconnection of the PL and ▶data line concentrator◀ services and recognition of the quasi-ternary supervisory signalling.

1.08 The 28A1 Data Mounting is equipped with 16 card connectors which are electrically divided into two groups. The connectors for the left half of the data mounting (slots 1 through 8) are associated with connector J1 and the connectors for the right half (slots 9 through 16) are associated with connector J2. It is also equipped with a 50-pin plug (P3) for connection of the data sets to the PL facilities and concentrator lines.

1.09 The 208A adapter is plugged into either J1 or J2 of the 28A1 Data Mounting to provide the wiring necessary to interconnect the line-side data set and concentrator-side data set to the ▶AR463-type circuit pack.◀

1.10 Data Sets 108A and 109A have faceplates which physically obstruct three connector spaces (slots) of the 28A1 Data Mounting. Since one interconnection arrangement requires one Data Set 108A or 109A, one Data Set 109D or 109E, and one ▶AR463-type circuit pack,◀ five slots of the data mounting are required for each arrangement. Therefore, as previously mentioned, the 28A1 Data Mounting will accommodate up to three such arrangements ▶when Data Set 108A or 109A is used as the line-side data set.◀

1.11 The two associated data sets and ▶AR463-type◀ circuit pack plug into specific slots (Fig. 2) on the data mounting and the 208A adapter plugs into J1 of the data mounting for arrangements mounted in slots 1 ▶through 8◀ and/or J2 for the arrangements in slots ▶9 through 16.◀ At installations where two or less arrangements are required, only one 208A adapter is required.

1.12 ▶The slot assignments for installations using Data Set 108A or 109A as the line-side data set allow two arrangements to electrically fit in slots 1 through 8 while physically covering slots 1 through 10. The third arrangement fits into the last six slots. Since the faceplate on Data Set 109D or 109E is only one slot wide, the slot assignments for installations using either of these data sets as the line-side data set allow two arrangements to fit both electrically and physically in slots 1 through 8. In addition, two more arrangements will fit in slots 9 through 16.◀

1.13 At installations where only two arrangements are required, only connector J1 and slots 1, 2, and 5 (arrangement 1) and 3, 4, and ▶6 or◀ 8 (arrangement 2) will be used, thereby leaving slots ▶9 or◀ 11 through 16 and connector J2 available for use with other circuits. At installations where only one arrangement is required, only connector J1 and slots 1, 2, and 5, ▶or slots 3, 4, and 6◀ or connector J2 and slots 9, 10, and 13 or slots 11, 12, and 14 will be used.

2. PHYSICAL DESCRIPTION

2.01 This part describes the physical appearance of the ▶AR463, Series 1 circuit pack, AR463, Series 2 circuit pack,◀ and the 208A adapter. For

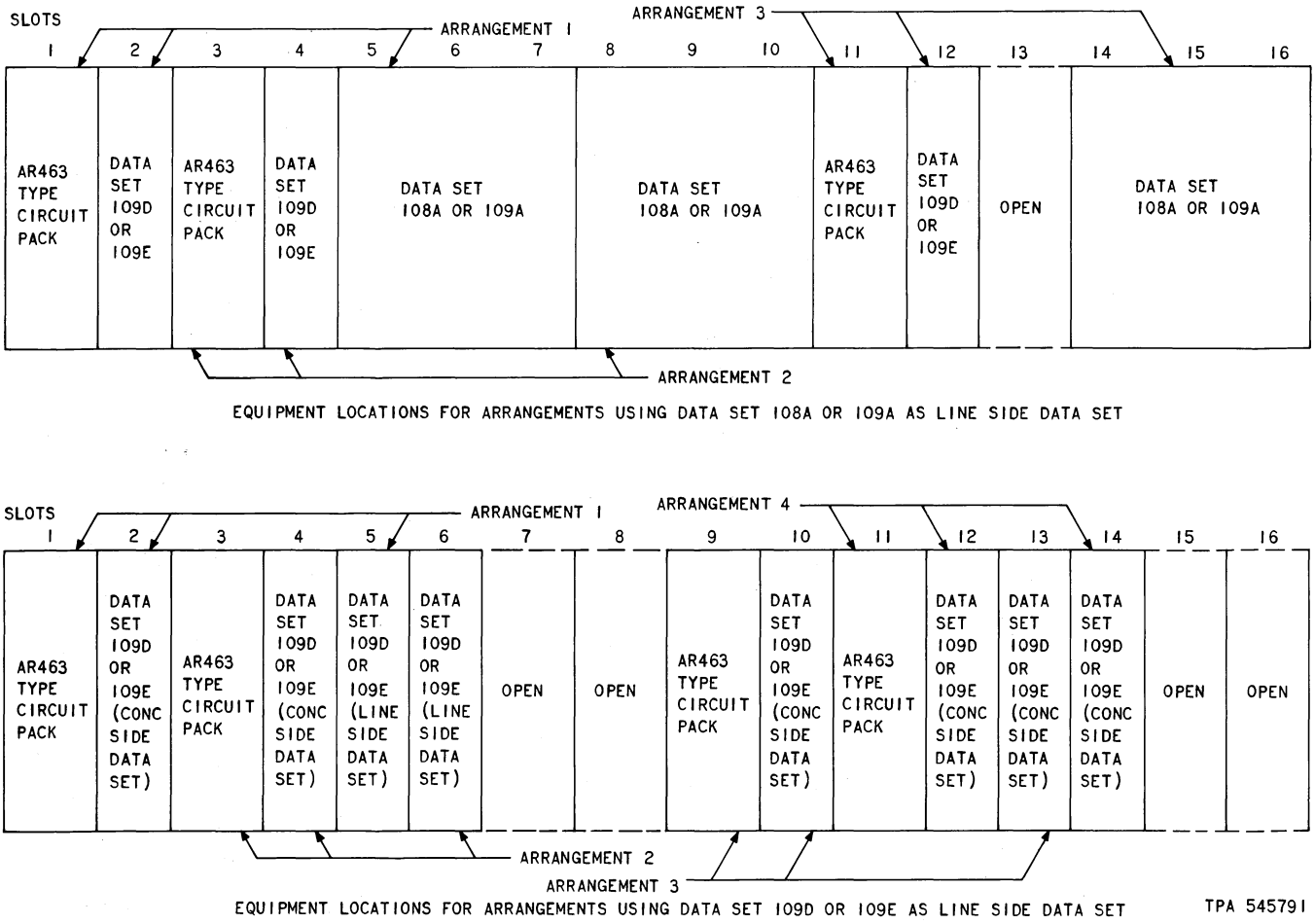


Fig. 2—Data Set and Circuit Pack Locations for 10-Type Data Line Concentrator Private Line Interconnection Arrangement

a description of the 28A1 Data Mounting, Data Set 108A, Data Set 109A, Data Set 109D, and Data Set 109E, see the appropriate section as follows:

590-102-124	28A1 Data Mounting—Identification
591-023-100	Data Set 108A-Type—Identification
591-024-100	Data Set 109A-Type—Identification
591-029-100	Data Set 109D-Type—Description
591-036-100	Data Set 109E-Type—Description

2.02 The ▶AR463-type circuit packs are◀ single plug-in printed circuit cards which are approximately 5-1/2 inches high, 1/2 inch wide, and 7-1/3 inches deep. ▶They are◀ equipped with a TEST switch which allows loop-around testing of FDX line-side data sets (Data Set 108A ▶or 109E from a Data Test Center (DTC)◀ while at the same time squelching the output of the concentrator-side data set. In addition, an optional compensation network is also provided to allow FDX use of Data Set 109E on the concentrator side of the arrangement.

2.03 The 208A adapter is a KS-16689-L4 50-pin plug which is appropriately strapped to interconnect the data sets to the ▶AR463-type circuit pack.◀

2.04 The voltage requirements for the data sets and circuit packs are +22 to +26 volts dc and −22 to −26 volts dc. These voltages are normally supplied by a KS-20575-L1 rectifier mounted on the 28A1 Data Mounting or other suitable power source via the 28A1 Data Mounting.

3. FUNCTIONAL DESCRIPTION (Fig. 3)

3.01 The PL ▶data line concentrator◀ interconnection arrangements provide the following features.

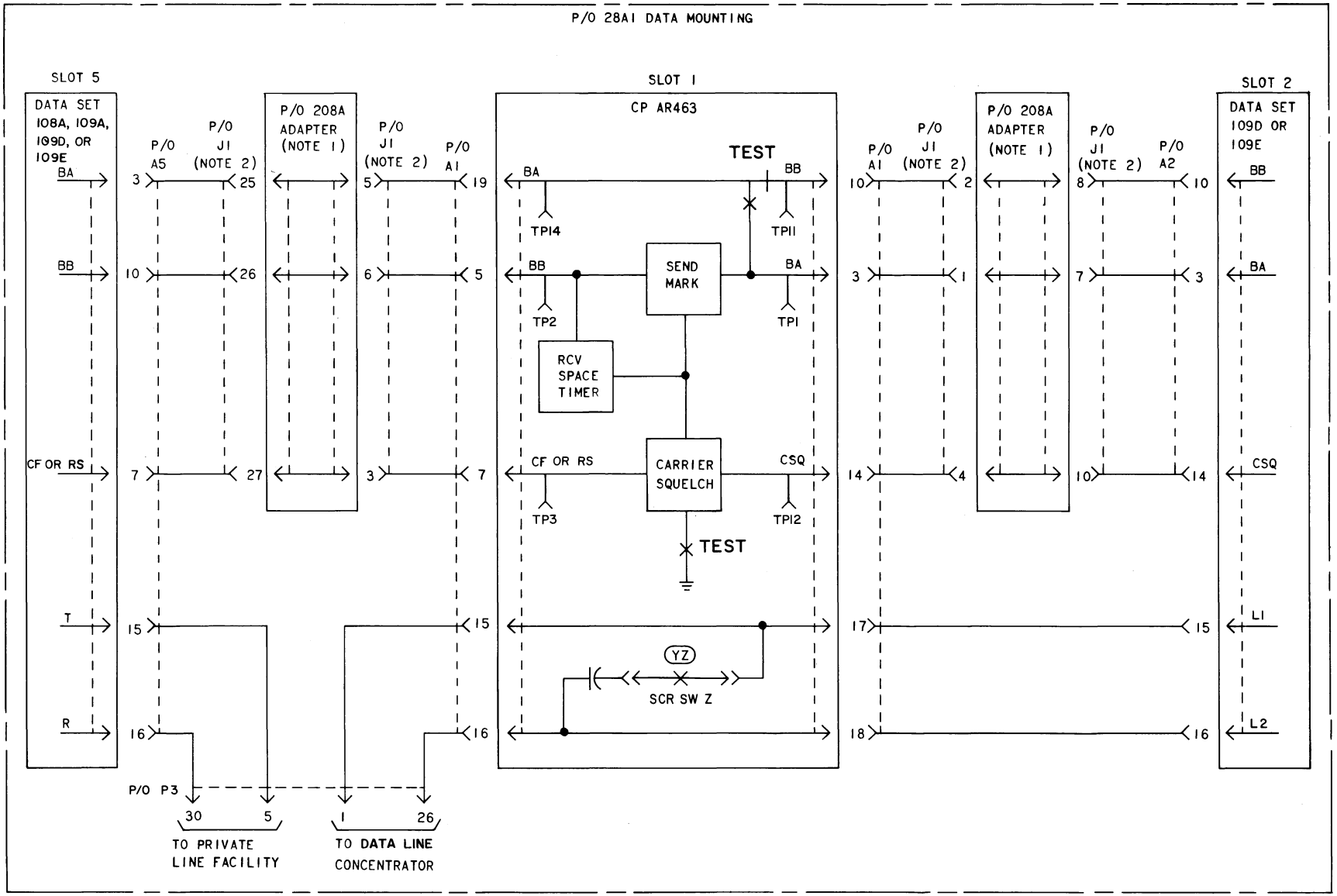
(a) Receive space timing—Converts a timed space received from the PL channel into a current squelch on the concentrator side.

(b) Carrier fail—Converts a carrier failure detected on the PL channel into a current squelch on the concentrator side.

(c) Test switch—Allows loop-around testing of an FDX line-side data set while maintaining current squelch on the concentrator-side data set.

3.02 The interface leads from the line-side data set (Data Set 108A, 109A ▶109D, or 109E)◀ to the ▶AR463-type circuit pack◀ are the transmitted data (BA) lead, the received data (BB) lead, and the data carrier detector (CF) lead ▶(Data set 108A or 109A) or receive supervision (RS) lead (Data Set 109D or 109E).◀ The inferface leads from the concentrator-side data set (Data Set 109D or 109E) to the ▶AR463-type circuit pack◀ are the transmitted data (BA) lead, received data (BB) lead, and the current squelch (CSQ) lead.

3.03 The functional block diagrams of Fig. 3 ▶and 4◀ show the PL ▶data line concentrator◀ interconnection arrangement using slots 1, 2, and



NOTES:

1. FOR 208A ADAPTER PIN NUMBERS FOR ARRANGEMENTS USING SLOTS 3,4 AND 6; 3, 4 AND 8; 9, 10 AND 13; OR 11, 12 AND 14, SEE FIG. 5.
2. IN ARRANGEMENTS USING SLOTS 9, 10, AND 13 OR 11, 12 AND 14, THIS WILL BE J2 OF THE 28A1 DATA MOUNTING.

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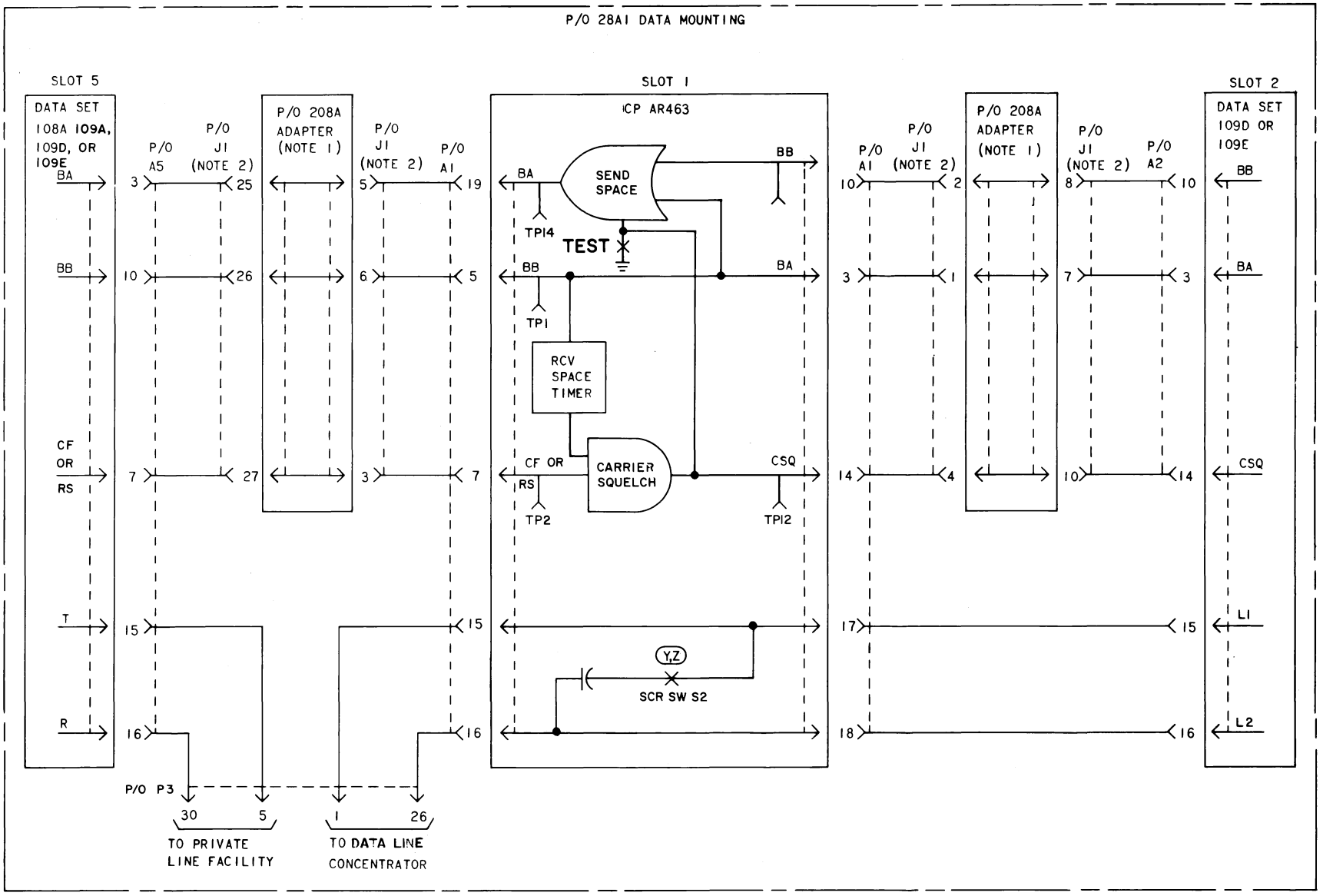
Fig. 3—Functional Block Diagram of 10-Type Data Line Concentrator Private Line Interconnection Arrangement Using AR463, Series 1 Circuit Pack and Slots 1, 2, and 5



NOTES:
1. FOR 208A ADAPTER PIN NUMBERS FOR ARRANGEMENTS USING SLOTS 3,4 AND 6; 3, 4, AND 8; 9, 10, AND 13; OR 11, 12 AND 14, SEE FIG. 5
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Fig. 4—Functional Block Diagram of 10-Type Data Line Concentrator Private Line Interconnection Arrangement Using AR463, Series 2 Circuit Pack and Slots 1, 2,and 5

5 of the 28A1 Data Mounting. The arrangements using slots ▶3, 4, and 6◀ ; 3, 4, and 8; 9, 10, and 13; or 11, 12, and 14 differ only in the pin assignments of connectors J1 and J2, plug P3, and the 208A adapter. The pin assignments of the 208A adapter (see Fig. 5) correspond to the pin assignments for connectors J1 and J2. The pin assignments for plug P3 are given in Table A.

3.04 ▶Data Set 109E-type is designed to face a capacitive line when used in the FDX mode. Option Z is provided on the AR463-type circuit pack so that a capacitor can be connected across the loop to simulate the effect of line capacitance at installations where the loop between the concentrator-side data set and the trunk terminating data set is almost purely resistive. There is no option provided for this when the Data Set 109E is used as the line-side data set in the FDX mode.

3.05 At installations where the loop between the concentrator-side data set and the trunk terminating data set consists of ***less*** than 6 miles of cable, option Z is to be installed in the AR463-type circuit pack.

3.06 At installations where the loop between the concentrator line-side data set and the trunk terminating data set is ***more*** than 6 miles of cable, option Y is to be installed in the AR463-type circuit pack.

3.07 Although option Z is provided for Data Set 109E-type FDX operation, it has little effect on the performance of Data Set 109D- or 109E-type HDX operation. Therefore, for simplicity of installation, the installation of options Y and Z is wholly dependent on the loop length and not the data set type or mode of operation.

3.08 At installations where the Data Set 109E is used as the line-side data set, a Data Set 109G will be used at the hub. If the loop has less than 1500 ohms of resistance, the hub data set will always have 522 ohms of padding inserted in the circuit. The remainder of the resistance needed to bring the loop up to 2000 ohms will be inserted in the Data Set 109E at the interconnection arrangement. This eliminates the necessity of placing a capacitor across the line in these installations.◀

3.09 When the station associated with a ▶data line concentrator◀ interconnection arrangement is in the idle or off mode, it will transmit a continuous spacing signal to the line. The spacing signal will be received at the interconnection arrangement by the line-side data set and then delivered to the ▶AR463-type circuit pack◀ via the BB lead.

3.10 Provided the spacing signal persists for approximately 1.5 seconds, the receive space timer is turned on enabling the carrier squelch circuit ▶and, (in the case of the AR463, Series 1 circuit pack), the send mark circuit.◀ The send mark gate ▶(AR463, Series 1 only)◀ clamps the concentrator-side data set BA lead marking.

3.11 Enabling the carrier squelch circuit will turn off the CSQ lead of the concentrator-side data set, thereby squelching its output. The loop current between the ▶trunk terminating data set◀ and the concentrator-side data set goes to zero. The concentrator-side data set interprets this no-loop current condition as a carrier fail and clamps its BB lead marking. This marking signal is delivered to the line-side data set BA lead via the ▶AR463-type circuit pack◀ , and the line-side data set sends a continuous marking signal to the station. The concentrator-side data set current squelch condition is recognized by the concentrator as the idle state.

3.12 When the outlying station is turned on, it transmits a marking signal to the line. This marking signal is received by the line-side data set and delivered to the ▶AR463-type circuit pack◀ via the BB lead. However, this time the receive space timer is turned off, which immediately releases the send mark gate ▶(AR463, Series 1 circuit pack only)◀ and carrier squelch circuit. The send mark gate ▶(AR463, Series 1 only)◀ unclamps the concentrator-side data set BA lead and the carrier squelch circuit turns on the CSQ lead.

3.13 When the CSQ lead is turned on ▶the voltage applied to the loop is detected by the concentrator and◀ current flows between the concentrator-side data set and the concentrator. This condition is recognized by the concentrator as a request for service. Provided one is available, the concentrator will connect the line to a trunk. If all trunks are busy, a camp-on signal will be sent to the station.

3.14 The signal path ▶through the AR463-type circuit pack◀ of data transmitted from the

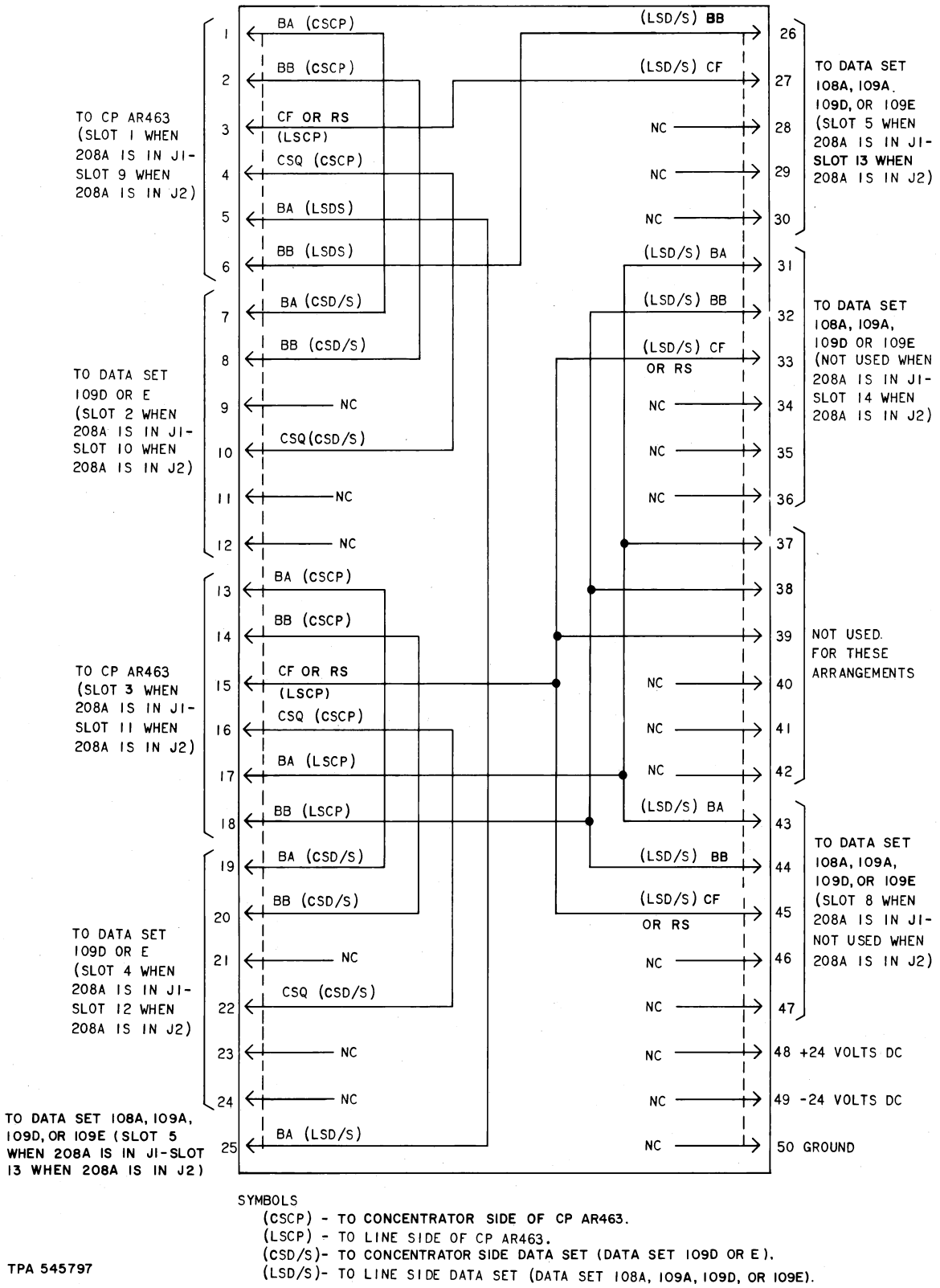

Fig. 5—208A Adapter—Pin Assignments

TABLE A

PIN ASSIGNMENTS FOR P3 OF 28A1 DATA MOUNTING

PINS	ASSIGNMENT
1 and 26	L1 and L2 of concentrator line (slot 1)
2 and 27	Not used
3 and 28	L1 and L2 of concentrator line (slot 3)
4 and 29	Not used
5 and 30	Tip and ring of private line facility (slot 5)
6 and 31	Tip and ring of private line facility (slot 6 when used)
7 and 32	Not used
8 and 33	Tip and ring of private line facility (slot 8 when used)
9 and 34	L1 and L2 of concentrator line (slot 9 when used)
10 and 35	Not used
11 and 36	L1 and L2 of concentrator line (slot 11 when used)
12 and 37	Not used
13 and 38	Tip and ring of private line facility (slot 13 when used)
14 and 39	Tip and ring of private line facility (slot 14)
15 and 40	Not used
16 and 41	Not used
48	+24 volts dc
49	—24 volts dc
50	Ground

concentrator side toward the line side is straight-through wiring except for the transfer contacts of the TEST switch ▶for the series 1 circuit pack and via the send space gate for the series 2 circuit pack.◀ The signal path of data transmitted from the line side toward the concentrator ▶side◀ is via the send mark gate ▶for the series 1 circuit pack and straight-through wiring for the series 2 circuit pack. In addition, all data transmitted in this direction◀ is monitored by the receive space timer ▶in both series 1 and 2 circuit packs.◀

3.15 When the station TTY is turned off or an end-of-transmission (EOT) character is detected in the stunt box of the station TTY, the station will transmit a continuous spacing signal to the line. As before, the spacing signal will be received by the line-side data set and delivered to the ▶AR463-type circuit pack◀ via the BB lead. The ▶AR463-type circuit pack◀ will react as described in 3.10 and 3.11. The concentrator will recognize the transition from the current state to the no-current state as a request for disconnect. As long as the loop current remains at zero, the concentrator will consider the line idle.

3.16 A carrier failure on a PL voiceband facility or the last leg of a PL telegraph facility causes the line-side data set to turn off its CF (Data Set 108A or 109A) or RS (Data Set 109D or 109E) lead. This in turn enables the carrier failure circuit of the ▶AR463-type circuit pack◀ , which turns off the concentrator-side data set CSQ lead.

In cases where the carrier failure occurs on other than the last leg of a PL telegraph facility, the hub circuit is arranged to space-hold on a carrier failure, causing a continuous spacing signal to be sent to the arrangement. This again turns on the receive space timer circuit, enabling the carrier squelch circuit which turns off the concentrator-side data set CSQ lead. In either case, the concentrator-side data set output is squelched and the trunk is returned to idle.

3.17 Operation of the TEST switch on the ▶AR463-type◀ connects the send and receive leads together on the line-side data set and presents a carrier squelch condition to the concentrator-side data set. This allows loop-back tests of a line-side FDX data set to be made from the outlying station, hubbing point, DTC, or telegraph testboard and causes the concentrator to treat the line as idle while the test is being performed.

4. REFERENCES

4.01 The following schematic drawings, circuit descriptions, and Bell System Practices (BSPs) pertain to the private line interconnection arrangement for the line side of the 10-type Data Line Concentrator System.

SD- & CD-1D176-01 Data Systems Station—28-Type Data Mounting

SD- & CD-1D200-01 Data Systems—Private Line—Interconnection Circuits (Line Side)

SD- & CD-3D024-01 Data Systems Station—Data Set 108A

SD- & CD-3D025-01 Data Systems Station—Data Set 109A

SD- & CD-1D172-01 Data Systems Station—Data Set 109D

SD- & CD-1D198-01 Data Systems Station—Data Set 109E

590-102-124 28A1 Data Mounting—Identification

591-023-100 Data Set 108A-Type—Identification

591-024-100 Data Set 109A-Type—Identification

591-029-100 Data Set 109D-Type—Description

591-036-100 Data Set 109E-Type—Description

591-023-Z10 Data Set 108-Type—Single Private Line Station—Using Data Auxiliary Set 820D-L1A—in 10-Type Data Line Concentrator Systems

591-810-Series 10-Type Data Line Concentrator System

591-811-Series 10-Type Data Line Concentrator